WHAT IS CLAIMED IS:

1. A non-naturally occurring peptide ligand which competes for binding HER2 in an <u>in vitro</u> assay with a peptide ligand having the formula:

$Xaa_{(1-14)}$-Cys-Xaa_{16}-Gly-Pro-Gly-Cys-$Xaa_{(21-27)}$ (SEQ ID NO:90)

wherein $X_{(1-14)}$ is absent or between one and fourteen amino acids; Xaa16 is an amino acid selected from the group consisting of Met, Thr, Cys and Ile and Xaa(21-27) is absent or between one and 7 amino acids.

2. The peptide ligand of claim 1 having the following formula:

$Xaa_{(1-7)}$-Cys-Xaa_9-Gly-Pro-Gly-Cys-$Xaa_{(14-20)}$ (SEQ ID NO:92)

wherein $X_{(1-7)}$ is absent or between one and seven amino acids; and Xaa_9 is an amino acid selected from the group consisting of Met, Ile, Thr or Cys and $Xaa_{(14-20)}$ is absent or between one and seven amino acids.

3. The peptide ligand of claim 2 having the following formula:

$Xaa_{(1-7)}$-Cys-Ile-Gly-Pro-Gly-Cys-$Xaa_{(14-20)}$ (SEQ ID NO:161).

4. A peptide ligand having the formula A-A wherein A is the peptide ligand of claim 3 and "-" is an optional linker domain.

5. The peptide ligand of claim 3 having the following formula:

$Xaa_{(1-5)}$-Trp-Gly-Cys-Ile-Gly-Pro-Gly-Cys-$Xaa_{(14-20)}$ (SEQ ID NO:93)

wherein $Xaa_{(1-5)}$ is absent or between one and five amino acids.

6. The peptide ligand of claim 5 having the following formula:

$Xaa_{(1-3)}$-Glu-Xaa_5-Trp-Gly-Cys-Ile-Gly-Pro-Gly-Cys-Xaa_{14}-Xaa_{15}-Leu-$Xaa_{(17-20)}$ (SEQ ID NO:87)

wherein $Xaa_{(1-3)}$ is absent or between one and three amino acids,
Xaa_5 is an amino acid,
Xaa_5 is an amino acid,
Xaa_{14} is an amino acid,
Xaa_{19} is an amino acid and
$-Xaa_{(17-20)}$ is absent or between one and four amino acids.

7. The peptide ligand of claim 6 wherein $X_{(1-3)}$- is absent or selected from the group consisting of
Gln-Arg-Asn-
Leu-Ser-Pro-
Glu-Asn-Trp-
Ala-Ser-His-
Lys-Leu-Asn-
Thr-Gln-Ala-
Ala-Pro-Arg-
Gln-Val-Tyr-
Arg-Thr-Glu-
Phe-Ala-Gly-
Thr-Ala-Arg-
Arg-Pro-His-
Asn-Val-Cys-
Cys-Ile-Asp-
Tyr-Glu-Trp-
Arg-Trp-Asp-
His-Trp-Met-
Asn-Trp-Pro-
Phe-Asn-Trp-

Phe-Ser-Gly-
Gly-Gly-Trp-
Leu-Trp-Phe-
Gly-Ile-Pro-
Trp-Trp-Thr-
Leu-Gly-Trp-
Ser-Pro-Trp-
Arg-Gly-Trp-,
Xaa_5 is selected from the group consisting of:
Ala, Thr, Met, Val, Arg, Glu, Asp, Ser, Gln, Pro, Gly, Phe and Lys,
Xaa_{14} is selected from the group consisting of:
Glu, Lys, Arg, Asp, Ser, Ala, Asn, Gly, Pro and Gln,
Xaa_{15} is selected from the group consisting of:
Met, Phe, Ala, Met, Cys, Gln, Glu, Ala, Trp, Phe, Leu, Val, Tyr, Trp, and
$-Xaa_{(17-20)}$ is a four amino acid peptide having the following formula:

$-Xaa_{17}-Xaa_{18}-Cys-Xaa_{20}$.

8. The peptide ligand of claim 7 wherein $-Xaa_{(17-20)}$ is selected from the group consisting of:
-Gln-Ala-Cys-Met (SEQ ID NO:102)
-Leu-Gln-Cys-Trp (SEQ ID NO:103)
-Met-Ser-Cys-Val (SEQ ID NO:104)
-Leu-Arg-Cys-Ile (SEQ ID NO:105)
-Gln-Ala-Cys-Leu (SEQ ID NO:106)
-Leu-Ser-Cys-Leu (SEQ ID NO:107)
-Ile-Gly-Cys-Leu (SEQ ID NO:108)
-Leu-Ala-Cys-Leu (SEQ ID NO:109)

-Leu-Ser-Cys-Ile (SEQ ID NO:110)
-Met-Asn-Cys-Leu (SEQ ID NO:111)
-Leu-Arg-Cys-Leu (SEQ ID NO:112)
-Leu-Lys-Cys-Leu (SEQ ID NO:113)
-Leu-Gly-Cys-Leu (SEQ ID NO:114)
-Leu-Asn-Cys-Ile (SEQ ID NO:115)
-Met-Gly-Cys-Leu (SEQ ID NO:116) and
-Met-Ala-Cys-Leu (SEQ ID NO:117).

9. The peptide ligand of claim 6 wherein -$Xaa_{(17-20)}$ is a four amino acid peptide having the following formula

-Cys-Xaa_{18}-Xaa_{19}-Cys

wherein Xaa_{18} is an amino acid and Xaa_{19} is an amino acid.

10. The peptide ligand of claim 9 wherein -$Xaa_{(17-20)}$ is selected from the group consisting of:
-Cys-Ala-Trp-Cys (SEQ ID NO:118)
-Cys-Ser-Trp-Cys (SEQ ID NO:119)
-Cys-Glu-Pro-Cys (SEQ ID NO:120)
-Cys-Asp-Trp-Cys (SEQ ID NO:121)
-Cys-Glu-Trp-Cys (SEQ ID NO:122)
-Cys-Asn-Trp-Cys (SEQ ID NO:123) and
-Cys-Gly-Trp-Cys (SEQ ID NO:124).

11. The peptide ligand of claim 1 having the formula:
$Xaa_{(1-10)}$-Glu-Xaa_{12}-Trp-Xaa_{14}-Cys-Cys-Gly-Pro-Gly-Cys-Xaa_{21}-Xaa_{22}-Xaa_{23}-$Xaa_{(24-27)}$ (SEQ ID NO:126)

wherein $Xaa_{(1-10)}$ is absent or between 1 and 10 amino acids;
Xaa_{12} is an amino acid;

Xaa_{14} is an amino acid;
Xaa_{21} is an amino acid;
Xaa_{22} is an amino acid;
Xaa_{23} is an amino acid selected from the group consisting of Val and Leu and
$Xaa_{(24-27)}$ is absent or between one and four amino acids.

12. The peptide ligand of claim 11 wherein $Xaa_{(1-10)}$ is a 10 amino acid peptide having the following formula:
-Cys-$Xaa_{(2-7)}$-Cys-Xaa_9-Gly-; $Xaa_{(24-27)}$ is a four amino acid peptide having the following formula:
$Xaa_{(24-26)}$-Cys
wherein $Xaa_{(2-7)}$ is a six amino acid peptide and
$Xaa_{(24-26)}$ is a 3 amino acid peptide.

13. A peptide ligand having the formula B-B wherein B is the peptide ligand of claim 12 and wherein "-" is an optional linker domain.

14. A peptide ligand having the formula A-B wherein A is the peptide ligand of claim 12 and B is the peptide ligand of claim 11 and wherein "-" is an optional linker domain.

15. The peptide ligand of claim 12 wherein $Xaa_{(1-10)}$ has the following formula:
Cys-Xaa_2-Trp-Val-Xaa_5-Xaa_6-Xaa_7-Cys-Xaa_9-Gly- (SEQ ID NO:127).

16. The peptide ligand of claim 15 wherein $Xaa_{(1-10)}$ has the following formula:
Cys-Xaa_2-Trp-Val-Xaa_5-Xaa_6-Xaa_7-Cys-Xaa_9-Gly- (SEQ ID NO:127).

and Xaa_2 is an amino acid selected from the group consisting of Ala and Ser;
Xaa_5 is an amino acid selected from the group consisting of Ser, Leu, Ala, Arg and Val;
Xaa_6 is an amino acid selected from the group consisting of Phe, Val and Leu;
Xaa_7 is an amino acid selected from the group consisting of Asp Gln, Tyr, Trp, Leu and His and
Xaa_9 is an amino acid selected from the group consisting of Gly, Phe and Leu.

17. The peptide ligand of claim 16 wherein $Xaa_{(1-10)}$ has the following formula:
Cys-Ser-Trp-Val-Leu-Xaa_6-Xaa_7-Cys-Gly-Gly- (SEQ ID NO:162).

18. The peptide ligand of claim 17 wherein $Xaa_{(24-26)}$ has the following formula:
Xaa_{24}-Xaa_{25}-Xaa_{26} and
Xaa_{24} is an amino acid selected from the group consisting of Trp, Val, Gly and Ala;
Xaa_{25} is an amino acid selected from the group consisting of Asn, Lys, Asp, Glu and His and
Xaa_{26} is an amino acid selected from the group consisting of Ala, Ser and Val.

19. The peptide ligand of claim 17 wherein $Xaa_{(24-26)}$ has the following formula:
Xaa_{24}-Xaa_{25}-Xaa_{26} and
Xaa_{24} is an amino acid selected from the group consisting of Trp, Val, Gly and Ala;

Xaa_{25} is an amino acid selected from the group consisting of Asn, Lys, Asp, Glu and His and
Xaa_{26} is an amino acid selected from the group consisting of Ala, Ser and Val.

20. The peptide ligand of claim 19 wherein
Xaa_{24} is Val;
Xaa_{25} is Asn and
Xaa_{26} is Ala.

21. A polypeptide which comprises:
(a) a peptide ligand according to any of claims 1, 4, 11, or 13 and
(b) an immunoglobulin constant region sequence.

22. The polypeptide of claim 21 further comprising a linker sequence.

23. The polypeptide of claim 20 or 21 wherein the immunoglobulin constant region sequence is the constant domain of an IgG heavy chain.

24. The polypeptide of claim 22 wherein said constant region sequence comprises the CH3 domain of an immunoglobulin heavy chain.

25. The polypeptide of claim 24 further comprising the hinge region of an immunoglobulin heavy chain.

26. The polypeptide of claim 25 wherein said constant region sequence comprises at least functionally active hinge, CH2 and CH3 domains of the constant region of an immunoglobulin heavy chain.

27. The polypeptide of claim 21 further comprising an additional functional moiety.

28. The polypeptide of claim 27 wherein the additional functional moeity is selected from the group consisting of a cytotoxic agent and an enzyme.

29. The polypeptide of claim 27 wherein the additional functional moiety is a cytotoxic agent.

30. A pharmaceutical composition comprising the peptide ligand of claim 1 and pharmaceutically acceptable excipient.

31. A pharmaceutical composition comprising the polypeptide of claim 21 and a pharmaceutically acceptable excipient.

32. A pharmaceutical composition comprising the polypeptide of claim 28 and a pharmaceutically acceptable excipient.

33. An isolated DNA molecule encoding the peptide ligand of claim 1.

34. The DNA molecule of claim 33 further comprising an expression control sequence operably linked to the DNA molecule.

35. An expression vector comprising the DNA molecule of claim 33 wherein the control sequence is recognized by a host cell transformed with the vector.

36. A host cell transformed with the vector of claim 35.

37. A method for expressing a DNA molecule encoding a peptide ligand in a host cell, comprising culturing the host cell of claim 36 under conditions suitable for expression of the peptide ligand.

38. The method of claim 37 further comprising recovering the peptide ligand from the culture medium.

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